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The information and statistics set out in this section and other sections of this document were extracted from different official government publications, available sources from public market research and other sources from independent suppliers, and from the independent industry report prepared by China Insights Industry Consultancy Limited ("CIC"). We engaged CIC to prepare an independent industry report in connection with the [REDACTED]. *The information from official government sources has not been independently verified by us, the Sponsors,* [REDACTED], [REDACTED], [REDACTED], *any of the* [REDACTED], *any of their respective directors and advisors, or any other persons or parties involved in the* [REDACTED], *and no representation is given as to its accuracy. Accordingly, the information from official government sources contained herein may not be accurate and should not be unduly relied upon.*

GLOBAL AND CHINA'S PASSENGER VEHICLE MARKET

The global automobile market has exhibited a generally stable growth in the recent years. The sales volume of automobiles reached 95.8 million units globally and 32.2 million units in China in 2024, and is expected to rise to 108.6 million units globally and 38.6 million units in China in 2029. Automobiles are classified into two main categories based on their intended use and design: passenger vehicles and commercial vehicles. Passenger vehicles are designed and manufactured primarily for transporting people rather than goods, and constitute a much larger market than commercial vehicles globally. The global passenger vehicle market has gradually recovered as the global economy rebounds, with the sales volume reaching 77.7 million units in 2024, which is expected to further grow to 87.4 million units in 2029. China has the world's largest passenger vehicle market with a sales volume increasing from 20.8 million units in 2020 to 28.3 million units in 2024, accounting for 36.4% of the global total sales volume in 2024. Driven by the continuous implementation of favourable policies for stabilizing vehicle consumption and promoting vehicle upgrades, as well as the growing acceptance of new energy vehicles in the market, the sales volume of passenger vehicles in China is expected to further grow to 34.3 million units in 2029.

The major players in China's passenger vehicle market include domestic OEMs, foreign OEMs, and foreign joint venture OEMs. In recent years, Chinese automotive brands, namely the brands that are owned and controlled by domestic OEMs, have become a dominant force in China's passenger vehicle market, with a market share in terms of sales volume growing from 35.6% in 2020 to 63.3% in 2024, and expected to grow to 75.0% in 2029. Furthermore, Chinese automotive brands are capturing a larger market share of high-end vehicles in addition to economy models. This shift reflects the strengthened capabilities of Chinese OEMs to meet evolving consumer preferences and the enhanced competitiveness of their offerings.
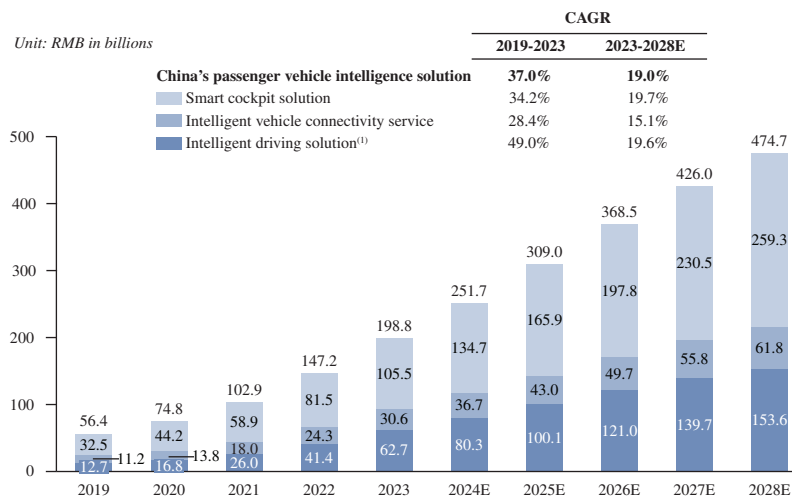
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GLOBAL AND CHINA'S AUTOMOTIVE INTELLIGENCE MARKET

Overview of Automotive Intelligence Solution Industry

As technology advances and consumer demands evolve, the integration of intelligence has emerged as a pivotal trend within the automotive industry. The automotive intelligence transformation has been fueled by the convergence of the three main pillars, namely smart cockpits, intelligent vehicle connectivity, and intelligent driving, which are propelling higher safety standards, enhanced driving assistance, and a more comfortable user experience for vehicles. The global automotive intelligence market size achieved RMB666.9 billion in 2023 and is expected to reach RMB1,507.7 billion in 2028, representing a CAGR of 17.7%. The China's automotive intelligence market size was RMB204.1 billion in 2023 and is expected to reach RMB498.1 billion in 2028, representing a CAGR of 19.5%. In particular, the intelligence solutions for passenger vehicles are the largest segment of the global and China's automotive intelligence market, accounting for more than 95% of revenue of both markets in 2023.

Benefitting from the expanding passenger vehicle market, ongoing innovations and upgrades in intelligent vehicle technologies, as well as heightened consumer demands for intelligent vehicle features, and supportive government policies, the development of automotive intelligence for passenger vehicles has accelerated both globally and in China. The global market size of passenger vehicle intelligence solutions was RMB645.0 billion in 2023, and is expected to reach RMB1,422.0 billion in 2028, representing a CAGR of 17.1%. The market size of passenger vehicle intelligence solutions in China reached RMB198.8 billion in 2023, accounting for 30.8% of the global market, and is expected to grow to RMB474.7 billion by 2028, accounting for 33.4% of the global market, and such growth represents a CAGR of 19.0% from 2023 to 2028.

Market Size of China's Passenger Vehicle Intelligence Solution Industry in terms of Revenue, 2019-2028E

	CAGR	
Unit: RMB in billions	2019-2023	2023-2028E
China's passenger vehicle intelligence solution	**37.0%**	**19.0%**
Smart cockpit solution	34.2%	19.7%
Intelligent vehicle connectivity service	28.4%	15.1%
Intelligent driving solution[1]	49.0%	19.6%

Source: China Passenger Cars Association, CIC

Note:

(1)   Intelligent driving solution equips vehicles with autonomous driving capabilities, realizing functions of ADAS with Level 1 to Level 2 automation and automated driving system (ADS) with Level 3 to Level 5 automation.

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Introduction of Vehicle Electrical/Electronic Architecture (E/E Architecture)

E/E architecture refers to the design and arrangement of electrical and electronic systems, including hardware and software, that control various vehicle functions such as active safety, infotainment, and vehicle control. As vehicles become more electrified and intelligent, the number of Electronic Control Units (ECUs) increases, necessitating a more efficient, simplified, and intelligent E/E architecture. This has led to the adoption of domain-centralized E/E architecture, which consolidates ECUs performing similar functions into specific domains.

Typically, domain-centralized E/E architecture is divided into five functional domains: smart cockpit, intelligent driving, powertrain, chassis, and body. The smart cockpit domain, serving as the primary interface between the driver and the vehicle, is crucial for user interaction and significantly impacts the driving experience. Technological advancements and innovations in the smart cockpit domain are essential for enhancing overall vehicle intelligence.

GLOBAL AND CHINA'S PASSENGER VEHICLE SMART COCKPIT SOLUTION MARKET

Overview of Passenger Vehicle Smart Cockpit Solution Industry

Passenger vehicle cockpit solutions can be broadly classified into two categories based on their intelligence level and functionality: the traditional, or "non-smart," cockpit solution and the smart cockpit solution. The traditional cockpit solution, largely mechanical, primarily offers basic vehicle control functions and simple entertainment features which are also relatively static and do not support OTA upgrades. Its hardware and software structures are fairly straightforward, which lack intelligent interaction capabilities, relying on physical buttons and knobs for operation. In contrast, the smart cockpit system can provide more intelligent in-vehicle experience for drivers and passengers, and is a key component of the passenger vehicle intelligence. A smart cockpit solution mainly consists of its core component, the smart cockpit domain controller, and other parts such as in-vehicle displays (including the central information display as well as the co-driver and rear-seat entertainment displays), LCD instrument panel, head-up display (HUD), streaming rearview mirror, and IMS. It also features robust software capabilities including human-machine interaction, telematics services, and full-scenario expansion. These transform the passenger vehicle into an intelligent mobile space, providing drivers and passengers with a comprehensive experience of safety, intelligence, and enjoyment.

The chart below illustrates the value chain of smart cockpit solution industry. Upstream participants mainly consist of suppliers of hardware such as PCB, display panels, as well as chips, and suppliers of software such as middleware, operating systems, and applications. Midstream players primarily include emerging technology companies specializing in smart cockpit solutions and traditional Tier-1 suppliers to OEMs. Downstream participants in the value chain are mainly the OEMs.

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Value Chain of China's Passenger Vehicle Smart Cockpit Solution Industry
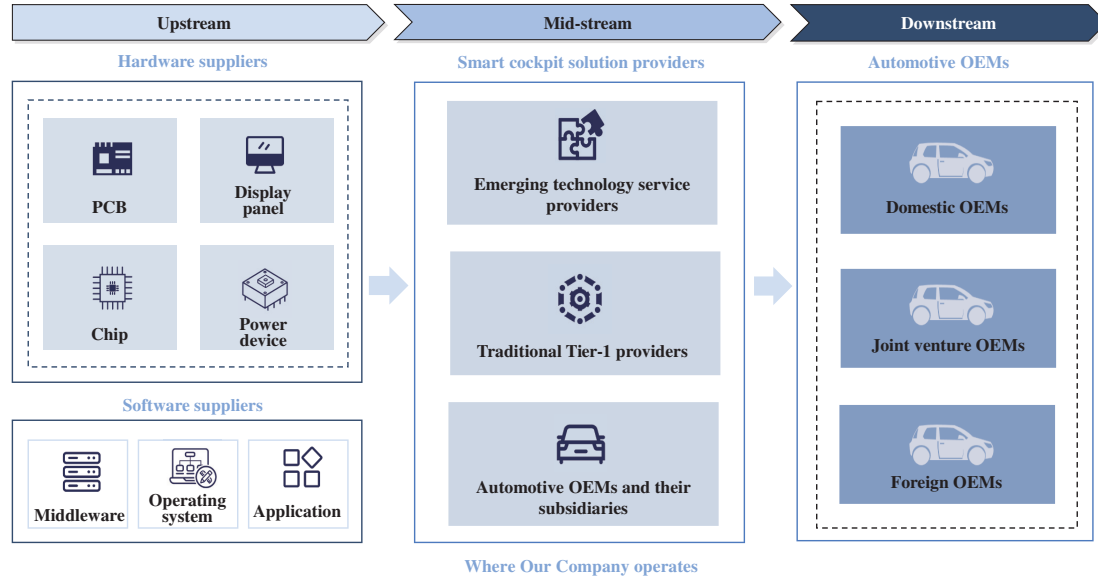
Source: CIC

The smart cockpit system encompasses a variety of solutions and components, including integrated software-hardware solutions like domain controller solutions, software solutions such as operating systems and automotive applications, and hardware components like streaming rearview mirrors. Integrated software-hardware solutions are essential for the smart cockpit system. The domain controller solution, a key type of these integrated solutions, acts as the brain of the smart cockpit. Utilizing a highly integrated computing platform, it enables centralized management and intelligent control of various in-vehicle functions, such as information interaction, monitoring, and full-scenario connectivity. Its robust data processing and decision-making capabilities ensure efficient operation and high coordination within the smart cockpit system.

OEMs typically prefer to purchase smart cockpit solutions directly from external suppliers, as these suppliers offer distinct advantages tailored to the OEMs' specific requirements:

- *Expertise*. With extensive industry insights, deep technological expertise, and reliable supply chains, Tier-1 suppliers can swiftly deliver advanced smart cockpit solutions. This capability allows OEMs to accelerate their R&D processes and enhance the intelligence of their vehicle models more efficiently.

- *Technological Innovation*. Tier-1 suppliers always lead in integrating the latest technological advancements, including AI, intelligent connectivity and human-machine interaction. Collaborating with these suppliers allows OEMs to stay at the cutting edge of technology innovation, catering to diverse and customized user preferences.

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- *Cost Efficiency*. Tier-1 suppliers leverage economies of scale and focused production, offering cost-effective smart cockpit solutions to OEMs. This advantage helps OEMs reduce internal R&D expenses by procuring completely ready-to-use solutions from external partners.

In recent years, while more OEMs have made attempts to develop smart cockpit solutions with higher computing power and sophisticated human-machine interaction capabilities, many face challenges due to high technical barriers, long R&D cycles, significant investments and rapid pace of technological iteration. As a result, OEMs are increasingly relying on Tier-1 suppliers. Only a limited number of OEMs have the capability to independently develop smart cockpits, and even fewer can achieve comprehensive development of both software and hardware. Typically, OEMs focus on developing software in-house while outsourcing hardware manufacturing to specialized suppliers. The main challenges faced by OEMs in the R&D of smart cockpits include:

- *High Initial Investment*. Developing smart cockpits independently requires a substantial initial R&D investment, due to the high technical barriers. Accumulating the necessary expertise and resources is challenging, resulting in unstable and extended product development cycles.

- *Pressure of Technological Iteration*. The fast-paced evolution of market demands requires rapid iteration of smart cockpit technologies. OEMs pursuing independent development face significant pressure to keep up with these technological upgrades and innovations. Compared to specialized external suppliers, OEMs lack the cutting-edge R&D experience required to stay ahead in this rapidly evolving field.
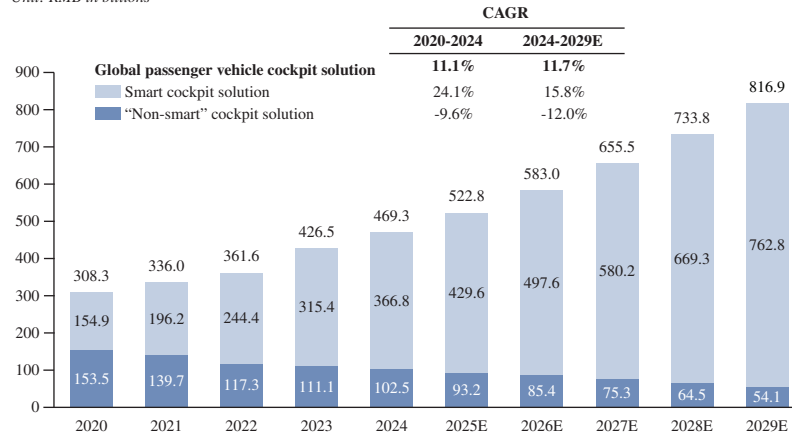
Global and China's Market Size of Passenger Vehicle Smart Cockpit Solutions

The cockpit system is a key component of a passenger vehicle. The global market size of passenger vehicle cockpit solution industry reached RMB469.3 billion in 2024, and is projected to grow to RMB816.9 billion in 2029, representing a CAGR of 11.7% during the period. In addition, the market size of passenger vehicle cockpit solution industry in China reached RMB156.8 billion in 2024, and is projected to grow to RMB310.4 billion in 2029, representing a CAGR of 14.6% during the period.
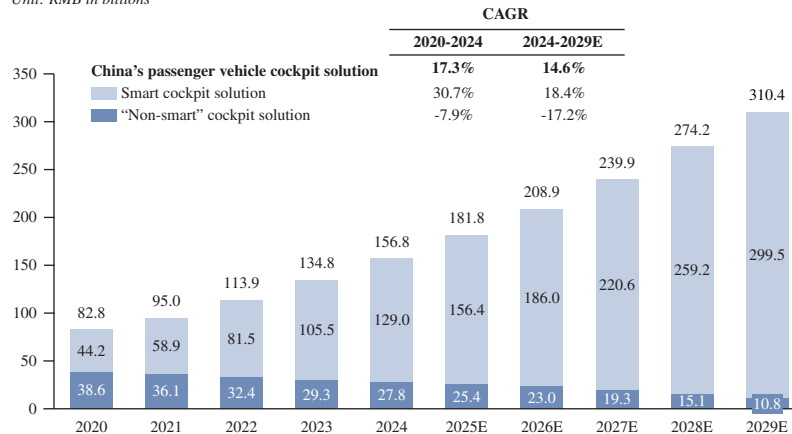
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Market Size of Global Passenger Vehicle Cockpit Solution Industry, in Terms of Revenue, 2020-2029E

Unit: RMB in billions

	CAGR	
	2020-2024	2024-2029E
Global passenger vehicle cockpit solution	**11.1%**	**11.7%**
Smart cockpit solution	24.1%	15.8%
"Non-smart" cockpit solution	-9.6%	-12.0%

Market Size of China's Passenger Vehicle Cockpit Solution Industry, in Terms of Revenue, 2020-2029E

Unit: RMB in billions

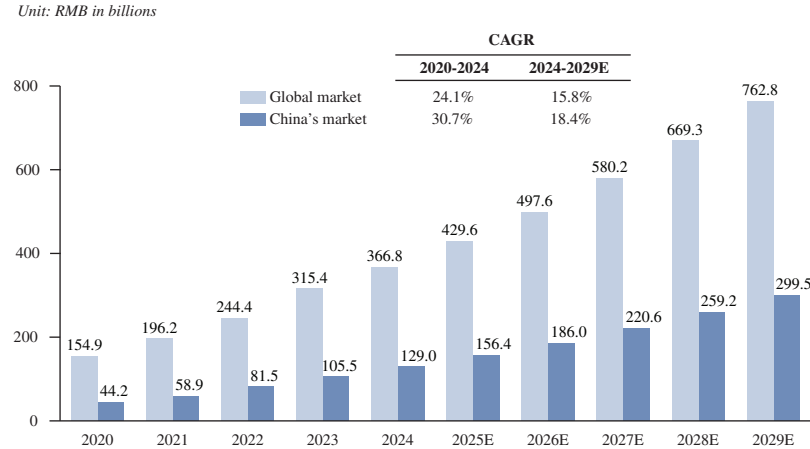|	CAGR	
	2020-2024	2024-2029E
China's passenger vehicle cockpit solution	**17.3%**	**14.6%**
Smart cockpit solution	30.7%	18.4%
"Non-smart" cockpit solution	-7.9%	-17.2%

Source: China Passenger Cars Association, CIC

As for the different segments of passenger vehicle cockpit solution industry, driven by the increasing adoption of advanced technologies, automation and connectivity features in passenger vehicles, the traditional cockpit solution has been rapidly replaced by the smart cockpit solution. As a result, the market size of traditional cockpit solution for passenger vehicles has decreased year by year, while the market of smart cockpit solutions for passenger vehicle has been growing rapidly. The global market size of passenger vehicle smart cockpit solutions grew from RMB154.9 billion in 2020 to RMB366.8 billion in 2024, representing a CAGR of 24.1%, and is expected to reach RMB762.8 billion in 2029, representing a CAGR of 15.8%. In terms of revenue, the penetration rate of global smart cockpit solution has increased from 50.2% in 2020 to 78.2% in 2024, and is expected to reach 93.4% in 2029. China is the world's largest passenger vehicle market. Chinese OEMs actively incorporate the latest

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intelligent technologies to provide drivers and passengers with superior in-vehicle experience. This fosters the development of smart cockpit solutions in China, making China the largest passenger vehicle smart cockpit solution market in the world. The market size of China's passenger vehicle smart cockpit solutions grew from RMB44.2 billion in 2020 to RMB129.0 billion in 2024, with a CAGR of 30.7%. As Chinese consumers' demand for intelligent, connected, and immersive driving experience continues to grow, China's passenger vehicle smart cockpit solution market is expected to reach RMB299.5 billion in 2029, representing a CAGR of 18.4% from 2024 to 2029. In terms of revenue, the penetration rate of China's smart cockpit solution has increased from 53.4% in 2020 to 82.3% in 2024, and is expected to reach 96.5% in 2029.

Market Size of Global and China's Smart Cockpit Solution Industry for Passenger Vehicle, in Terms of Revenue, 2020-2029E

Unit: RMB in billions

	CAGR	
	2020-2024	2024-2029E
Global market	24.1%	15.8%
China's market	30.7%	18.4%

Year	Global market	China's market
2020	154.9	44.2
2021	196.2	58.9
2022	244.4	81.5
2023	315.4	105.5
2024	366.8	129.0
2025E	429.6	156.4
2026E	497.6	186.0
2027E	580.2	220.6
2028E	669.3	259.2
2029E	762.8	299.5

Source: China Passenger Cars Association, CIC

Key Drivers of Global and China's Passenger Vehicle Smart Cockpit Solution Industry

The industry of passenger vehicle smart cockpit solutions globally and in China has significant growth potential driven by a number of factors:

- *Evolving consumer demands for better driving experience and personalization.* From the consumers' perspective, passenger vehicles have been gradually transitioning from mere transportation tools to becoming an intelligent mobile space, with more emphasis on providing better experience and personalization. According to the "Insight into China's NEV Consumption in 2023" released by AutoHome Research Institute, intelligence has become an important factor in vehicle purchasing decisions, as evidenced by over 80% of automotive consumers having considered buying intelligent vehicles in 2023. The consumer demand of passenger vehicle for user experience and personalization drives the further adoption of smart cockpits on passenger vehicles.

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- *OEM's accelerating deployment of automotive intelligence.* By introducing technologies such as artificial intelligence, big data, and the IoT, OEMs are now able to develop more innovative and differentiated products to improve their brand competitiveness. The continual iteration of algorithms has enabled smart cockpits to build a strong software ecosystem with rich applications, continuously optimize the automatic upgrading, as well as enhance the human-machine interaction experience and perception of user needs utilizing multimodal interactions such as voice and touch. Thus, OEMs continue to increase R&D investment in intelligent technologies to address the growing consumer needs, driving the accelerated development of the smart cockpit industry.

- *Constant innovation of software and hardware technology.* Upgrades in software and hardware provide automotive consumers with a more intelligent, convenient, and comfortable driving experience. For example, automotive-grade SoC chips with high performance and compatibility can process multiple parallel tasks faster and more accurately, run complex algorithms, enable high-resolution displays, achieve more intelligent functions, and improve energy efficiency. These advancements are crucial for the evolution of smart cockpit solutions. Moreover, the software architecture is undergoing an upgrade to a SOA, a more flexible and scalable architecture for intelligent vehicle software systems, which enables more efficient updates and upgrades. Thanks to the continual improvements in software and hardware technologies, smart cockpits are increasingly incorporating sophisticated and high-value features. Consequently, the price of smart cockpit solution per vehicle in China is expected to rise from approximately RMB4,560 in 2024 to approximately RMB8,726 in 2029.

- *Supportive policies and regulations.* Many countries around the world have made automotive intelligence an important strategic direction for the transformation and upgrading of the automotive industry, where smart cockpits play a significant part. For example, the implementation of the European Union General Safety Regulations has greatly driven the demand for passenger vehicles equipped with smart cockpits. In China, certain governmental authorities have also adopted a series of policies, including the Strategy for Innovative Development of Intelligent Vehicles (《智慧汽車創新發展戰略》) and Implementation Opinions on Enhancing Reliability in Manufacturing (《製造業可靠性提升實施意見》), with a view to creating a favorable environment for the development of the smart cockpit solution industry.

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o   Several key Chinese government departments, including the National Development and Reform Commission, Cyberspace Administration of China, Ministry of Science and Technology, and Ministry of Industry and Information Technology, have jointly promulgated the Strategy for Innovative Development of Intelligent Vehicles (《智慧汽車創新發展戰略》), or the Strategy. The Strategy encourages local governments to implement customized policies and measures to effectively promote the innovation and development of intelligent vehicles. It highlights the need for advancing key technologies, such as integrated perception of multi-source sensor data, advanced intelligent terminals, intelligent computing platforms, and automotive wireless communication networks. Local governments are urged to introduce supportive policies and diversify funding channels to drive research and development in these areas and in major engineering projects. As an industry pivoting around these technologies, the Strategy is expected to create a favorable policy environment and financial support for the smart cockpit industry, helping to reduce overall costs, accelerate technological innovation, and drive the commercialization of intelligent cockpit technologies. Additionally, the Strategy promotes the establishment of legal and regulatory frameworks to govern the testing, approval, usage and supervision of intelligent automobiles. It calls for functionality, reliability and safety certifications for key software and hardware components, with certification standards and guidelines tailored to different levels of intelligent vehicles. This is expected to set clear regulatory guidelines and technical standards for the smart cockpit industry, thereby enhancing product safety and reliability, bolstering consumer confidence and driving the innovation and application of smart cockpit technologies.

o   The Ministry of Industry and Information Technology, Ministry of Education, Ministry of Science and Technology, Ministry of Finance, and State Administration for Market Regulation have jointly promulgated the Implementation Opinions on Enhancing Reliability in Manufacturing (《製造業可靠性提升實施意見》), or the Implementation Opinion. This opinion aims to guide local departments and industry institutions in raising reliability standards in manufacturing, across machinery, electronics, and automobiles sectors. Local authorities are encouraged to establish foundational reliability standards that cover general requirements, management, design, analysis, testing, evaluation and maintenance support throughout manufacturing process, and integrate reliability indicators into mandatory standards. Furthermore, the Implementation Opinion offers tax deductions for research, product design and pilot testing, reducing financial burden on companies operating in smart cockpit industry. These measures are designed to incentivize innovation investment and drive technological advancements within the smart cockpit industry, ensuring the components and systems of smart cockpits meet higher quality standards throughout design, manufacturing and operation.

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Trend of Global and China's Passenger Vehicle Smart Cockpit Solution Industry

The following are the recent trends in global and China's passenger vehicle smart cockpit solution industry:

- *Development towards intelligent and high-end evolution driven by customer needs.* Driven by evolving consumer preferences for better driving experience, OEMs around the world strive for high-quality passenger vehicle smart cockpit solutions. In China, domestic OEMs lead this trend and employ flexible R&D and production mechanisms to accelerate innovation and launch of new products with superior user experience, requiring smart cockpit solution suppliers to speed up development of novel solutions. Collaboration between smart cockpit solution providers and Chinese automotive brands can foster robust technological synergy and enhance the overall competitiveness of their passenger vehicles. Furthermore, the trend towards high-end passenger vehicle products led by these domestic OEMs is catalyzing the upgrading of hardware and software in smart cockpit solutions, continuously enhancing the driving experience of automotive consumers.

- *OEMs' preference in providers with comprehensive capabilities.* OEMs tend to collaborate with smart cockpit solution providers that possess comprehensive technology capabilities integrating software, hardware and intelligent vehicle connectivity. Such smart cockpit solution providers can meet OEMs' diverse customization needs for components, thereby reducing the communication and management costs associated with procuring parts from multiple suppliers. Providers with strong software capabilities in algorithms, modules, and intelligent vehicle connectivity can integrate multiple functions and process data in real time. When combined with hardware design and manufacturing capabilities, these providers can continuously enhance the intelligence level of smart cockpit solutions. In China, only a few providers possess comprehensive technology capabilities, affording them a significant competitive edge in the industry.

- *Rising penetration rate of smart cockpit solutions.* The penetration rate of smart cockpit solutions is expected to continue increasing in various regions worldwide. In China, the rapid development of intelligent technologies, the transformation of consumer demands, and the introduction of supportive policies have led to the accelerated rise in the penetration rate of smart cockpit solutions. For example, domain controller solutions, an essential component of smart cockpits, have seen their penetration rate in passenger vehicles in China grew from 13.7% in 2020 to 44.1% in 2024, which is expected to reach over 90% by 2029, according to CIC.

- *Increasing industry concentration.* As the leading OEMs continue to increase their competitiveness, the passenger vehicle market in China is expected to become more concentrated. The market share in terms of sales volume of the top five OEMs in China increased from 33.4% in 2021 to 41.5% in 2024. These OEMs prefer to collaborate with top-tier smart cockpit solution providers to share R&D resources

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and optimize cost-effectiveness. Therefore, the top-tier smart cockpit solution providers who have a solid collaboration with leading OEMs will enjoy more business growth opportunities. In addition, these top-tier smart cockpits typically have comprehensive capabilities, significant technological accumulation, and production scale effect, which enable them to gain a larger market share, driving the concentration in the smart cockpit solution industry.

- *Accelerating overseas expansion of Chinese smart cockpit solution providers.* Chinese OEMs and other companies throughout the automotive industry value chain are accelerating their expansion into overseas markets. This thus expedites Chinese smart cockpit solution providers to enter international markets. Additionally, international OEMs have a growing demand for advanced smart cockpit technologies which drives more collaboration among these OEMs and top-tier Chinese smart cockpit solution providers.

- *Multimodal human-machine interaction driven by AI large model technology.* Artificial intelligence large models possess robust data processing, semantic understanding and perception capabilities, promoting the development of human-machine interface in smart cockpits. By combining novel large model technology, a smart cockpit system can better cater to preferences of users and realize richer multimodal interaction functions which incorporate voice commands, gesture recognition, eye tracking, and natural language processing to provide a seamless and intuitive user experience. The smart cockpit system with advanced multi-modal interaction functions actively provide precise feedback and actions through multi-modal information perception combined with environmental conditions and user habit learning, further enhancing the user experience of the smart cockpit system, the perception and decision-making ability of autonomous driving as well as the intelligent service level of the vehicle connectivity platform for passenger vehicles.

- *Iteration of domain controllers towards higher integration.* Automotive domain controllers are expected to achieve multi-domain fusion and further improve the integration of domain control to be responsible for the vehicle's perception, decision-making, execution, and control, enabling seamless synergy among various systems including vehicle control, driving, and cockpit.

In the recent years, several nations and regions have levied tariffs on Chinese battery electric vehicles (the "BEVs"). The European Union has agreed to impose high anti-subsidy tariffs on Chinese-made BEVs for five years, with additional rates reaching up to 35.3% on top of the existing 10% tariff, varying by OEMs. Both Chinese OEMs and foreign OEMs producing in China will be impacted. In the United States, an additional 100% tariff was imposed on Chinese-imported BEVs since September 27, 2024, resulting in a total tariff of 102.5% without a defined expiration date. Canada implemented a similar tariff policy on October 1, 2024, with a total tariff rate of 106.1%. These tariffs are expected to primarily impact OEMs by increasing export costs and reducing sales volumes for OEMs.

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However, for the smart cockpit solutions industry, which operates upstream of OEMs, these tariffs on NEVs are unlikely to have a significant impact on smart cockpit solution industry, for the following reasons:

- *Subject of the tariffs imposed*. Smart cockpit solution providers serve as one of the upstream suppliers of automotive industry, and there is no tariff imposed on smart cockpit solutions or products. Therefore, the tariffs on Chinese new electric vehicles are not expected to have a direct and immediate impact on smart cockpit solution industry.

- *Application scenarios*. Smart cockpit solutions can be integrated into vehicles of all energy types, not solely NEVs. In addition, the overall automotive industry is transforming towards intelligence and connectivity, which is expected to further drive the demand for smart cockpit solutions and the adoption of higher-value smart cockpit solutions.

- *Technological innovation and product upgrades*. The smart cockpit system serves as a pivotal interface for users to experience vehicle intelligence, and it is one of key factors in strengthening the competitiveness of vehicles. Chinese OEMs are expected to adopt smart cockpits solutions with improved functionalities and user experience to increase the appeal of their vehicle models in overseas markets, thereby offsetting the impact of higher tariffs on product competitiveness. This dynamic is anticipated to promote technological innovation and product upgrades within the smart cockpit solution industry, ultimately fostering the development of the industry.

- *Limited contribution of NEV exports*. According to the China Passenger Car Association (the "CPCA"), China's NEV export volume reached 1.95 million units in 2024, representing only 6.9% of China's passenger vehicle sales volume. Given this relatively small portion, tariffs imposed on NEVs are not expected to significantly impact on China's automobile industry and smart cockpit solution industry.

- *Tariff scope*. The recently imposed tariffs by the U.S. and E.U. specifically target NEVs produced by Chinese OEMs. According to the CPCA, China's exports of NEVs to the European market in 2024 accounted for approximately 26.3% of China's automobile exports to Europe. Similarly, exports of NEVs made up approximately 27.7% of China's automobile exports to the U.S. during the same periods. Given that NEV exports only account for a relatively small portion of automotive exports to both markets, the tariffs targeting only NEVs are unlikely to have a significant impact on China's entire automobile industry. Furthermore, China's OEMs have implemented strategic measures such as setting up manufacturing facilities overseas to counteract the tariffs' impact. These initiatives are expected to further mitigate the impact of tariffs on Chinese vehicles.

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- *Emerging Southeast Asian markets*. In the recent years, Southeast Asia has provided strong support for China's NEV OEMs through favourable policies. Additionally, the region has seen significant growth in purchasing power of consumers and rapid expansion of NEV sector. Consequently, NEV export volume from China to Southeast Asia increased from 74.0 thousand units in 2023 to 114.0 thousand units in 2024, representing a growth rate of 54.1%. As a result, Southeast Asia became an emerging market for China's OEMs, complementing the U.S. and E.U, markets. Therefore, it is expected that rapid development of Southeast Asian NEVs market would create strong demands for smart cockpit solutions, driving the continuous advancement and development of China's smart cockpit solution industry.

In conclusion, tariffs recently imposed on China's NEVs will not have material and adverse effects on China's automobile industry and smart cockpit solution industry.

Entry Barriers and Key Success Factors in China's Passenger Vehicle Smart Cockpit Solution Industry

The success of companies operating in China's passenger vehicle smart cockpit solution industry depends on the following key factors:

- *Comprehensive technology capabilities across software, hardware and cloud-based telematics services.* Development of smart cockpit solutions necessitates deep technical expertise of the providers in multiple areas such as smart cockpit system software algorithms, domain controllers, and sensors. Integrated smart cockpit solutions require providers to possess not only strong hardware design and manufacturing capabilities but also robust software development and cloud-based telematics service abilities. Such integrated solutions also put forward higher requirements for the stability, reliability and security of the system. Solution providers with strong technology capabilities, solid R&D and innovation capacity, and in-depth understanding and experience in the industry can successfully develop high-performance, high-reliability integrated smart cockpit solutions.

- *Long-term collaboration with top-tier customers and partners.* OEMs have stringent entry requirements for smart cockpit solution providers with lengthy and complex validation processes, and they generally do not easily switch their cockpit suppliers during the lifecycle of a vehicle model, which usually ranges from two to five years. The smart cockpit solution providers that have long-term and stable partnerships with top-tier OEMs can achieve mass production across multiple vehicle models and obtain the opportunity to participate in joint system development. Recognition of these providers' technical strength by OEMs during the collaboration process ensures their continuous and stable development. OEMs provide valuable market feedback and customer demand information to these smart cockpit solution providers, helping them optimize their product design to better satisfy market needs. In addition, the smart cockpit solution provider's cooperation with strategic partners along the value chain of the automotive industry, such as on technology and resources, enables the collaborating parties to better utilize their resources to expand the market and enhance automotive consumers' driving experience.

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- *Ability to develop platforms for high-computing power chips.* Self-built proprietary high-computing power chip platforms are a crucial trend in the smart cockpit solution industry. Smart cockpit chip platforms must meet the automotive industry's rigorous requirements for reliability, durability, and real-time performance. The ability to develop high-performance chip platforms enables solution providers to better develop and utilize chips, harnessing the high computing power to adapt and support various smart cockpit functions. High-computing power chip platforms can also improve the flexibility of product development and realize complex human-machine interaction, further enhancing product competitiveness.

- *Large-scale production and supply chain management capabilities.* Smart cockpit systems involve a large number of hardware devices, including screens, sensors, and electronic control units, which require a high degree of integration and standardization. Mass production can reduce production costs and increase production efficiency, thereby increasing the market competitiveness of the smart cockpit products. Moreover, smart cockpit solution providers need to establish close partnerships with suppliers to ensure stable supply and quality control of components.

Competitive Landscape of China's Passenger Vehicle Smart Cockpit Solution Industry

There are hundreds of market players in China's passenger vehicle smart cockpit solution industry, and the competitive landscape is relatively fragmented, with the top five providers taking up an aggregated market share of 32.8% in terms of revenue in 2024. The revenue from our passenger vehicle smart cockpit solution segment amounted to RMB2,441 million, ranking 11th in the industry, and accounted for 1.9% of the total market in terms of revenue in 2024.

The passenger vehicle smart cockpit solution industry consists of three types of suppliers based on the solution types offered: software-hardware integrated solution suppliers, software component suppliers and hardware component suppliers. The software-hardware integrated solution suppliers refer to those who possess the capability to integrate both software and hardware components to offer a comprehensive smart cockpit solution, that are designed to meet the OEMs' expectations for seamless integration of smart cockpit systems. With the evolving demands of the automotive industry and the increasing adoption of smart cockpit solutions, software-hardware integrated smart cockpit solutions are becoming increasingly popular for passenger vehicle. According to CIC, the software-hardware integrated offering has emerged as one of the mainstream delivery methods for solution providers to the OEMs in China, with a market size of approximately RMB77.9 billion, accounting for 60.4% of the total China's smart cockpit solution market size, in terms of revenue in 2024.

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Software-hardware integrated smart cockpit solution suppliers have proven to be more competitive due to several key advantages they provide to automotive OEMs:

(i) Cost optimization: Software-hardware integrated solutions from a single supplier are more cost-effective compared to traditional model of sourcing software and hardware components separately. By combining both components into a single package, OEMs can streamline procurement processes and reduce complexities and expenses involved in managing multiple suppliers. It also helps OEMs avoid compatibility issues that often arise when software and hardware components are sourced separately, further minimizing unexpected costs related to system integration and troubleshooting.

(ii) Shortened product R&D cycle: Integrating software and hardware into a single solution significantly accelerates the R&D progress by reducing the time needed for communication and coordination with software and hardware components suppliers separately. This streamlined development process allows OEMs to bring new products to market more quickly, enabling them to adapt to evolving market demands faster while maintaining high-quality standards.

(iii) Improved system performance: Seamlessly integrated software and hardware components enhance the efficiency and performance of the smart cockpit system. With both components designed to work in harmony, software-hardware integrated solutions offer optimized efficiency, faster response times and improved system stability, delivering a smoother and more reliable user experience.

Meanwhile, as the Chinese OEMs have emerged as key customers for smart cockpit solution providers, the market size of China's software-hardware integrated smart cockpit solutions installed on passenger vehicles manufactured by Chinese OEMs reached approximately RMB50.6 billion, accounting for 39.2% of the total China's smart cockpit solution market size, in terms of revenue in 2024.

China was the world's largest NEV market and the world's largest manufacturing country of NEVs, with a sales volume of 12.6 million in 2024, and the penetration rate of NEVs has grown from 5.8% in 2020 to 44.4% in 2024 and is expected to be 82.0% in 2029. The rising adoption of NEVs in China also contributes to rising automotive intelligence in the country. Compared to ICEs with relatively more complex structures, NEVs have a quicker evolution towards intelligence in vehicle structure, power systems and control systems. As a result, China's NEV market is a very important application segment for smart cockpit domain controller solutions.

The competitive landscape of China's smart cockpit domain controller solution industry for NEVs is relatively concentrated, with the top five providers taking up an aggregated market share of 47.5% in terms of shipment volume of smart cockpit domain controllers for NEVs in 2024, and the corresponding shipment volume of the Company amounted to 706.3 thousand, ranking second in the industry, and accounted for 11.9% of the total market in terms of shipment volume of smart cockpit domain controllers for NEVs in 2024.

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Top five providers[1] of smart cockpit domain controller solutions for NEVs[2] in China, in terms of shipment volume[3], 2024

Ranking	Smart Cockpit Domain Controller Solution Provider	Shipment volume (thousand)	Market share, 2024
1	Company A	~1,350	22.8%
2	**Our Company**	**706.3**	**11.9%**
3	Company B	~280	4.7%
4	Company C	~250	4.2%
5	Company D	~230	3.9%
	Total	**2,816.3**	**47.5%**

Source: CIC

Notes:

(1)   Exclude the pure manufacturing service providers and providers without their own factories.

(2)   Only include the new energy passenger vehicles produced in China in 2024.

(3)   According to CIC, it is a common practice in the smart cockpit industry and the automotive industry to use product shipment volume in units as an indicator to evaluate, compare and rank the market positions of smart cockpit product providers. The number of shipment volume usually reflects the acceptance and popularity of smart cockpit provider's products and further implies the product performance and quality of a certain provider, according to the same source.

Company A: A company founded in 1986 and listed on the Shenzhen Stock Exchange, primarily engaged in smart cockpit, intelligent driving, and intelligent connectivity services, and offering comprehensive smart cockpit solutions, including domain controller unit and information interaction systems.

Company B: A non-listed company founded in 2014, with a focus on developing vehicle domain controllers, intelligent connectivity software, and operational service products.

Company C: A company founded in 2017 and listed on NASDAQ, primarily engaged in core software and hardware solutions for vehicle connectivity, automation and electric mobility.

Company D: A company founded in 1958 and listed on the Korea Stock Exchange, primarily engaged in the field of vehicle mobility, home appliance & air solution and home entertainment, among others.

Main Materials for Passenger Vehicle Smart Cockpit Solution

The main raw materials for passenger vehicle smart cockpit solutions in China include chips, display panels and communication modules. Notably, chips are one of the most important raw materials, with their costs accounting for 20% to 35% of the overall cost of smart cockpit domain controllers. Specifically, chips can be applied in various in-vehicle modules and systems including vehicle control modules, in-vehicle infotainment, integrated control systems for power transmission and active-safety systems. Designed to meet the requirements of the automotive industry, such as operating temperature range, extended lifespan, and advanced reliability, chips are capable of achieving various rigorous functional requirements.

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Based on the application areas within a vehicle, automotive-grade chips can be divided into several categories, including chips for smart cockpit solutions, chips for intelligent driving solutions, vehicle control and safety chips, and communication chips, among others. Chips for smart cockpit solutions are responsible for processing and controlling various sensors, actuators, screens, and other devices within the cockpit. SoC (System-on-Chip) modules, the mainstream form of chips for smart cockpit solutions, are responsible for integrating most or all components of a cockpit. These SoC modules are able to streamline the integration of functions within the smart cockpit, which help enhance performance and efficiency, and support connectivity and security needs of drivers and passengers.

At present, the global automotive chip market is dominated by giant companies in the U.S., Europe, Japan and other regions. The table below sets forth a summary of top five SoC module suppliers for smart cockpit solution in China and their backgrounds:

Ranking of top five SoC module suppliers for smart cockpit solution in China, in terms of sales volume of vehicles, 2024

No.	Chips supplier	Background	Market share[1], 2024
1....	Chip Supplier A	A listed company primarily engaging in the design and development of wireless telecommunication products and services, and offering integrated circuits and system software for mobile devices and other wireless products, which is founded in 1985 and headquartered in the U.S.	~68%
2....	Chip Supplier B	A listed company primarily engaging in semiconductor products for the data center, embedded, gaming and PC markets, which is founded in 1969 and headquartered in the U.S.	~11%
3....	Chip Supplier C	A listed company primarily engaging in the research, development, design, manufacture, sales, and services of semiconductor products in automotive, healthcare, computer peripheral, connectivity, home appliance, and industrial end markets, which was founded in 2002 and headquartered in Japan.	~8%

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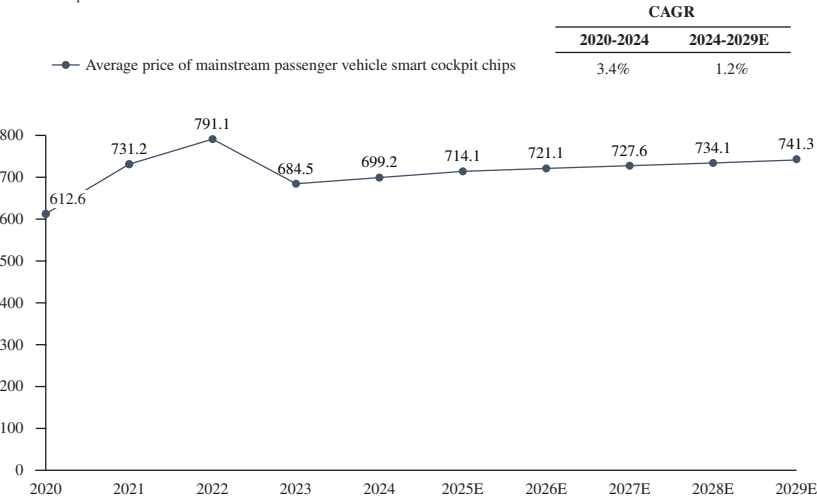| No.	Chips supplier	Background	Market share[1], 2024
4	Chip Supplier D	A non-listed company primarily engaging in providing information and communications technology (ICT) infrastructure and smart devices, which was founded in 1987 and headquartered in China.	~4%
5	Chip Supplier E	A listed company primarily engaging in manufacturing and sales of smartphones, semiconductor chips, printers, home appliances, medical equipment, and telecom network equipment, which was founded in 1969 and headquartered in Korea.	~3%

Source: CIC

Note:

(1) Calculated by the sales volume of vehicles equipped with respective supplier's SoC module for smart cockpit solution in China by the total sales volume of vehicles equipped with SoC module for smart cockpit solution in China in 2024.

However, since the outbreak of the COVID-19 pandemic at the beginning of 2020, insufficient production of automotive-grade chips had caused a global chip shortage starting in late 2020. Simultaneously, concerns about geopolitical factors and supply chain stability prompted companies within the Chinese automotive industry to begin stockpiling, further exacerbating the chip shortage and leading to a sharp increase of chip prices in both 2021 and 2022 in China. Since 2023, chip supply has stabilized and prices have returned to normal levels. In 2024, the average price of mainstream SoCs for passenger vehicle smart cockpit solutions in China reached RMB699.2 per unit. Advancements by domestic chip manufacturers in technology and production capacity are expected to enhance localization of chips, reducing the shortage risks and stabilizing prices. Moreover, with the upgrade and iteration of the chips, and the increasing market demand for chips with higher performance and higher computing power, the average price of mainstream SoCs for passenger vehicle smart cockpit solutions in China is expected to moderately increase with a CAGR of 1.2% from 2024 to 2029.

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Average Price of Mainstream Passenger Vehicle Smart Cockpit Chips in China, 2020-2029E

Unit: RMB per unit

	CAGR	
	2020-2024	**2024-2029E**
Average price of mainstream passenger vehicle smart cockpit chips	3.4%	1.2%

612.6 731.2 791.1 684.5 699.2 714.1 721.1 727.6 734.1 741.3

2020 2021 2022 2023 2024 2025E 2026E 2027E 2028E 2029E

Source: Annual Reports of listed companies, CIC

GLOBAL AND CHINA'S INTELLIGENT VEHICLE CONNECTIVITY INDUSTRY

Overview

The intelligent vehicle connectivity technology harnesses the power of the internet and advanced communication systems to connect vehicles with other vehicles, pedestrians, infrastructure, cloud platforms, and various other networks and devices. This enables vehicles to engage in real-time data exchange, information sharing, remote control and monitoring, and enhanced functionality within the vehicle and between the vehicle and its surroundings. By facilitating seamless connectivity and coordination, intelligent vehicle connectivity technology contributes to enhancing traffic efficiency and safety on the roads.
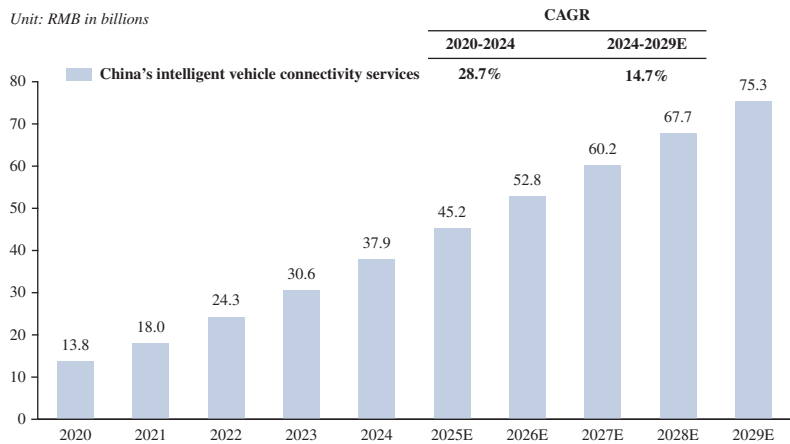
Intelligent vehicle connectivity services serve as a crucial application of intelligent vehicle connectivity technologies. These services primarily encompass, among others, R&D and maintenance services for vehicle connectivity platforms and systems, and user engagement optimization services enhancing car owner engagement to vehicle connectivity functions. User engagement optimization services, in particular, include a variety of customer-focused activities, such as user support, vehicle owner relationship management services and application ecosystem management services, which are designed to enhance the interaction and engagement between automotive brands and their customers. These services can help OEMs bolster their core competitiveness and achieve sustainable success.

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Global and China's Market Size of Intelligent Vehicle Connectivity Industry

As intelligent technology and the internet continue to converge, the connection between vehicles and the internet is becoming increasingly close, leading to a surge in innovative services and the thriving development of the intelligent vehicle connectivity industry. The global market size for the intelligent vehicle connectivity industry grew from RMB49.9 billion in 2020 to RMB107.3 billion in 2024, representing a CAGR of 21.1%, and is expected to further increase to RMB200.7 billion in 2029, representing a CAGR of 13.3%. Driven by intelligent transportation systems, data-driven economy, and policy support, the market size of China's intelligent vehicle connectivity industry increased from RMB13.8 billion in 2020 to RMB37.9 billion in 2024, representing a CAGR of 28.7% from 2020 to 2024, and expected to reach RMB75.3 billion by 2029, representing a CAGR of 14.7% from 2024 to 2029. China's intelligent vehicle connectivity market, as percentage of the global market, increased from 27.7% in 2020 to 35.4% in 2024 and is expected to reach 37.5% in 2029. Under the trend of ecosystem construction and cross-industry integration, the intelligent connectivity industry continues to expand application scenarios and comprehensively enhance the user experience, leading to rapid growing customer demand for intelligent vehicle connectivity services.

Market Size of China's Intelligent Vehicle Connectivity Industry, in terms of Revenue, 2020-2029E

Source: China Passenger Cars Association, CIC

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Key Drivers of Global and China's Intelligent Vehicle Connectivity Industry

The global and China's intelligent vehicle connectivity industry is poised for expansion, fueled by several key factors:

- *Development of intelligent transportation systems.* Intelligent transportation systems that employ advanced information and communication technologies enable vehicles to obtain real-time information on traffic and road conditions, offer different mobility solutions, and optimize the utilization of transportation resources. As the development of intelligent transportation systems progresses, OEMs and telematics technology providers integrate intelligent vehicle technologies into a broader transportation ecosystem, driving the rapid growth of the intelligent vehicle connectivity industry.

- *Increasing demand for safety and in-vehicle infotainment.* Consumers are placing greater emphasis on driving safety. Intelligent vehicle connectivity can provide safety assurances such as rescue services, satisfying consumers' needs for a secure driving experience. Also, consumers' demand for diverse in-vehicle infotainment continuously promotes the development of in-vehicle application platforms, accelerating the development of the intelligent vehicle connectivity industry.

- *Supportive governmental policies.* Some Chinese government authorities have jointly released the Guidelines for the Construction of the National Vehicles Connectivity Standard System (2023 Edition) (《國家車聯網產業標準體系建設指南 (智慧網聯汽車)(2023版)》), and the Notice on Carrying out Pilot Projects for Access and On-road Operation of Intelligent and Connected Vehicles (《關於開展智 慧網聯汽車准入和上路通行試點工作的通知》) to provide guidance on the development of the intelligent vehicle connectivity ecosystem and accelerate the growth of this industry.

Trend of Global and China's Intelligent Vehicle Connectivity Industry

The below sets forth the latest trends in the global and China's intelligent vehicle connectivity industry:

- *OEMs' increasing R&D investments in intelligent vehicle connectivity.* By connecting vehicles with the cloud, OEMs can provide better intelligent services and functions, thereby enhancing the market competitiveness of their vehicle models. Moreover, through intelligent vehicle connectivity services, OEMs can better maintain their user base and introduce value-added services such as software subscriptions and call centers, expanding their profit margins.

- *Accelerating cross-industry collaboration.* With the development of intelligent connected vehicles, automotive industry can integrate with various industries and form a vast ecosystem. OEMs, intelligent vehicle connectivity service providers,

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software developers, internet companies, and players in other industries are accelerating their involvement in the intelligent vehicle connectivity, collaborating in numerous areas such as technology sharing, data exchange, and standard formulation, promoting industry innovation and progress.

- *More intelligent and automated operation models.* Key technologies applied in intelligent vehicle connectivity, such as big data intelligent analysis and visualization, enable real-time processing and efficient analysis of massive data, providing strong data support for decision-makers of OEMs. Additionally, combined with the development of virtual and remote technologies, intelligent vehicle connectivity service will achieve a higher degree of automation and intelligence, greatly improving operational efficiency.

Entry Barriers and Key Success Factors of Global and China's Intelligent Vehicle Connectivity Industry

The success of companies within the global and China's intelligent vehicle connectivity sector hinges on several critical factors:

- *Required qualifications.* Intelligent vehicle connectivity service providers are required to obtain relevant qualifications, including the value-added telecommunications services business license for internet information services, also known as ICP License. New entrants have to invest a significant amount of time and gradually accumulate advanced technology to obtain such qualifications related to intelligent vehicle connectivity services.

- *Advanced R&D capabilities.* Intelligent vehicle connectivity services require strong technology capabilities in vehicle-to-everything communication, artificial intelligence, and smart cockpit solutions. Consequently, only service providers that have extensive industry know-how, long-term in-house R&D experience, qualified data processing and algorithm optimization capabilities can effectively compete in the industry.

- *Long-term cooperation experience with OEMs.* Intelligent vehicle connectivity service providers, through long-term stable cooperation with OEMs, have accumulated rich experience and resources, established solid cooperative relationships and reputation, and gained a foothold in the market. New entrants need to spend considerable time and resources building their brand influence and striving for cooperation opportunities with top-tier customers.

- *Broad collaboration with in-vehicle applications.* Intelligent vehicle connectivity service providers need to build a complete ecosystem, providing more diverse and differentiated content applications to attract a broader user base. Meanwhile, a large number of ecosystem partners enables resource sharing and business model creation, enhancing the service capabilities and competitiveness.

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Competitive Landscape of China's Intelligent Vehicle Connectivity Industry

In the intelligent vehicle connectivity industry, the major players consist of automotive OEMs who develop their own vehicle connectivity solutions and independent suppliers who provide OEMs with vehicle connectivity services, with approximately 80% and 20% of the total market in terms of revenue, respectively.

The competitive landscape among independent intelligent vehicle connectivity service suppliers is highly fragmented, and there are currently no dominant market participants in this market. Moreover, independent service suppliers provide a myriad of services, in standardized or customized solution type, including R&D and maintenance services for vehicle connectivity platforms and systems, and user engagement optimization services enhancing car owner engagement to vehicle connectivity functions. User engagement optimization services typically consist of user support, vehicle owner relationship management services and application ecosystem management services, among others. Our Group's revenue from intelligent vehicle connectivity services reached approximately RMB110.2 million in 2024, representing a market share of 0.3% in the intelligent vehicle connectivity industry.

SOURCE OF INFORMATION

CIC was commissioned to conduct an analysis of, and to report China's passenger vehicle intelligence industry at a fee of approximately RMB760,000. The commissioned report has been prepared by CIC independent of the influence of the Company and other interested parties. CIC's services include industry consulting, commercial due diligence, strategic consulting, etc. Its consulting team has been tracking the latest market trends across various industries, where it has relevant and insightful market intelligence.

CIC conducted both primary and secondary research using a variety of resources. Primary research involved interviewing key industry experts and leading industry participants. Secondary research involved analyzing data from various publicly available data sources, such as the National Bureau of Statistics and other Chinese governmental agencies' releases. The market projections in the commissioned report are based on the following key assumptions: (i) the overall social, economic, and political environment in China is expected to remain stable during the forecast period; (ii) China's economic and industrial development is likely to maintain a steady growth trajectory during the forecast period, accompanied by continuing urbanization; (iii) relevant key industry drivers, including evolving consumer demands for better driving experience, acceleration of automotive intelligence, constant innovation of technology and supportive policies, are likely to drive the passenger vehicle intelligence market in China during the forecast period; and (iv) there is no extreme force majeure or unforeseen set of industry regulations in which the market may be affected in either a dramatic or fundamental way.

Unless otherwise specified, all data and forecasts contained in this section are derived from the CIC report. The report has also incorporated actual and potential impact of the COVID-19 outbreak on our industry. The Directors have confirmed that there has been no occurrence of adverse change in the overall market information that would subject the data to significant restrictions, contradiction or negative effects since the date of the consultancy report.